Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	85	((analy$5 or examin$5 or study$5 or investigat$5 or evaluat$5 or explor$5 or prob$5 or scrutiniz$5) near3 process$5 near3 speed) with print$5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 09:22
L2	2	"6493099".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 09:16
L3	2534	print$5 near2 process$5 near2 speed	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 09:23
L4	356	print$5 adj process$5 adj speed	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 09:23
L5	37	(print$5 adj process$5 adj speed) with time	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 09:32
L6	1195	(process$5 adj (speed or time)) with (print$5 adj process$5)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 10:32
L7	65	((process$5 adj (speed or time)) with (print$5 adj process$5)) same calculat$5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 09:45
L8	3	6 and ((print$5 adj sheet adj number) near4 minute)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 09:37
L9	7	"5346318"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2004/11/17 09:45

No.	Publication No.	Title
1.	2000 - 293327	METHOD FOR TRANSFERRING DATA, PRINTING CONTROLLER AND RECORDING MEDIUM

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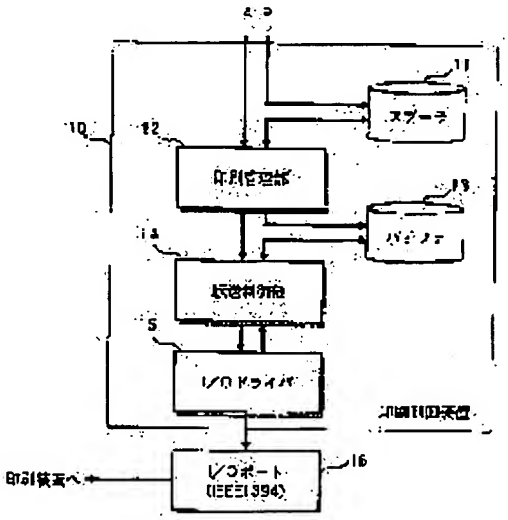
(54) METHOD FOR TRANSFERRING DATA, PRINTING CONTROLLER AND RECORDING MEDIUM

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a printing controller capable of effectively utilizing resources.

SOLUTION: This printing controller 10 is provided with at least a print managing part 12 which prepares print data for making a printer execute printing in a prescribed manner and a transfer controlling part 14 which transfers the print data periodically to a printer while buffering the print data. The part 14 detects a transfer rate of each cycle, dynamically changes the buffer size for print data of the next cycle in accordance with the transfer rate of the preceding cycle and suppresses the down time of the printer and the part 12. The print data in the first cycle are buffered in a buffer size that is minimally necessary for the printer to start to print, and when the total values of buffer sizes reaches a prescribed value, the buffer size for print data of subsequent cycles is made close to a maximum size in which the most efficient transfer can be performed.



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JAPANESE [JP,2000-293327,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS CORRECTION OR AMENDMENT

[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1] It is the approach performed in the computer apparatus which buffers in case the print data for performing printing of a predetermined gestalt are periodically transmitted to an airline printer. The print data of the first period based on a printing demand are buffered with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned The data transfer approach characterized by bringing the buffer size of the print data of future periods close to the maximum size in which the most efficient transfer is possible when the total value of the buffer size of the print data generated after printing initiation reaches a predetermined value.
[Claim 2] The data transfer approach according to claim 1 characterized by changing the buffer size of the print data of degree period dynamically according to the transfer rate of a front period until it is completed by fluctuation of the transfer rate after bringing close to said maximum size.
[Claim 3] The total value of said buffer size is the data transfer approach according to claim 1 characterized by being the value which controls the printing quiescent time of said airline printer.
[Claim 4] The data transfer approach according to claim 1 which detects the memory size for said buffering at the time of printing initiation, and is characterized by determining said maximum size based on this detection value.
[Claim 5] The data transfer approach according to claim 1, 2, or 3 characterized by performing a transfer of the print data from said computer apparatus to said airline printer with high-speed serial interface including the serial interface of USB, or IEEE standard 1394 to 1995 conformity.
[Claim 6] The print control unit which is equipped with a print-data creation means create the print data for making an airline printer perform printing of a predetermined gestalt, and the control means which detects the transfer rate of each period while transmitting to said airline printer periodically, buffering the created print data, and changes the buffer size of the print data of degree period dynamically according to the transfer rate of a front period, and is characterized by to control the quiescent time of said airline printer and said print-data creation means.
[Claim 7] Said control means buffers the print data of the first period based on a printing demand with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned The print control unit according to claim 6 characterized by being constituted so that the buffer size of the print data of future periods may be brought close to the maximum size in which the most efficient transfer is possible when the total value of the buffer size of the print data from said first period reaches a predetermined value.
[Claim 8] Said control means is a print control unit according to claim 7 characterized by continuing modification control of said buffer size until it is completed by fluctuation of the transfer rate after bringing close to said maximum size.
[Claim 9] Said control means is a print control unit according to claim 7 which detects the memory size for said buffering at the time of printing initiation, and is characterized by being constituted so that said maximum size may be determined based on this detection value.
[Claim 10] To the computer apparatus periodically transmitted to an airline printer while the print data for performing printing of a predetermined gestalt are buffered The print data of the first period based on a printing demand are buffered with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned When the total value of the buffer size of the print data generated after printing initiation reaches a predetermined value Until it is completed by fluctuation of the transfer rate after bringing the buffer size of the print data of future periods close to the maximum size in which the most efficient transfer is possible and bringing close to said maximum size further The

record medium with which the program code for performing processing which changes the buffer size of the print data of degree period dynamically according to the transfer rate of a front period was recorded and in which computer reading is possible.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a printing control technique, and relates to the efficient data transfer technique of the print data transmitted to an airline printer in more detail.
[0002]
[Description of the Prior Art] When printing the print data generated with the host computer with airline printers, such as a printer, a host computer is opened from a print-data creation activity by what (a spool file is formed) print data are once spooled for by the buffer memory of a host computer. Next, in order to transmit the spooled print data to an airline printer, it is common to enable it to perform creation of the print data based on a host computer and printing with an airline printer in parallel by starting another process, reading print data from a spool file according to the processing speed by the side of an airline printer, and transmitting to an airline printer side. The size of the print data which are read from a spool file and transmitted to an airline printer is usually about 4096 bytes, and buffering is performed by making this size into a unit.
[0003]
[Problem(s) to be Solved by the Invention] Recently, USB (Universal Serial Bas) and high-speed serial interface like IEEE standard 1394-1995 (IEEE=The Institute of Electrical and Electronics Engineers, Inc.) are used as a connection interface between a host computer and an airline printer. In such high-speed serial interface, the buffering size (for example, 4096 bytes) in which the print data received from the high order hierarchy were stored is divided into the packet size (for example, 512 bytes) decided by the specification of serial interface, and the I/O driver for carrying out the sequential transfer exists in an I/O Port in the data after division, i.e., a packet. In this I/O driver, in order to perform the transfer to an I/O Port in the transaction format for every packet, the bitter taste no ledge processing for checking that data have been normally transmitted for every packet is needed.
[0004] Usually, in an I/O driver, since an overhead arises for every one buffering, in order to raise a transfer rate, effectiveness becomes [the direction which enlarged buffering size passed to an I/O driver as much as possible] good. For example, since the direction of the count [of writing] to an I/O driver made into 1 megabyte decreases rather than making buffering size into 4096 bytes when transmitting 10 megabytes of print data (the overhead by the I/O driver decreases), efficient data transfer becomes possible.
[0005] However, if 1 time of buffering size (that is, transfer size of print data) is enlarged too much, before it reaches an airline printer and printing processing is started, it will take great time amount. In the meantime, in an airline printer side, since printing processing was stopped, there was a problem which cannot utilize a resource effectively.
[0006] Then, let it be a technical problem for this invention to offer the improved data transfer approach by which effective use of a resource is attained.
[0007] Other technical problems of this invention are to offer the record medium which becomes suitable when realizing the print control unit suitable for operation of this data transfer approach, and this print control unit on a computer.
[0008]
[Means for Solving the Problem] The data transfer approach of this invention which solves the above-mentioned technical problem It is the approach performed in the computer apparatus which buffers in case the print data for performing printing of a predetermined gestalt are periodically transmitted to an airline printer. The print data of the first period are buffered with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned When the total value of the buffer size of the print data generated after printing initiation reaches a

predetermined value, it is characterized by bringing the buffer size of the print data of future periods close to the maximum size in which the most efficient transfer is possible.
[0009] At the time of printing initiation, this maximum detects the memory size for said buffering, and determines it based on this detection value. According to the transfer rate of a front period, changing the buffer size of the print data of degree period until it is preferably completed by fluctuation of a transfer rate, even after bringing close to said maximum size is continued dynamically. Thereby, print data can be efficiently transmitted now. In addition, the futility at the time of transmitting print data to high-speed serial interface can be excluded by making total value of said buffer size into the value which controls the quiescent time of the creation means of the airline printer under printing actuation, or the print data of each period.
[0010] The print control unit of this invention which solves a technical problem besides the above A print-data creation means to create the print data for making an airline printer perform printing of a predetermined gestalt, While transmitting to said airline printer periodically, buffering the created print data, the transfer rate of each period is detected. It has the control means which changes the buffer size of the print data of degree period dynamically according to the transfer rate of a front period, and is characterized by controlling the quiescent time of said airline printer and said print-data creation means.
[0011] In the above-mentioned print control unit said control means For example, the print data of the first period based on a printing demand are buffered with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned When the total value of the buffer size of the print data from said first period reaches a predetermined value, it constitutes so that the buffer size of the print data of future periods may be brought close to the maximum size in which the most efficient transfer is possible. Moreover, modification control of said buffer size is continued after bringing close to said maximum size until it is completed by fluctuation of a transfer rate. In addition, for example, at the time of printing initiation, said maximum size detects the memory size for said buffering, and determines it based on this detection value.
[0012] The record medium of this invention which solves a technical problem besides the above To the computer apparatus periodically transmitted to an airline printer while the print data for performing printing of a predetermined gestalt are buffered The print data of the first period based on a printing demand are buffered with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned When the total value of the buffer size of the print data generated after printing initiation reaches a predetermined value Until it is completed by fluctuation of the transfer rate after bringing the buffer size of the print data of future periods close to the maximum size in which the most efficient transfer is possible and bringing close to said maximum size further It is the record medium with which the program code for performing processing which changes the buffer size of the print data of degree period dynamically according to the transfer rate of a front period was recorded and in which computer reading is possible.
[0013]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. First, an example of the printing system by which this invention is applied is shown in drawing 1 . This printing system connects a host computer 1 and an airline printer 2 through the high-speed serial interface based on IEEE standard 1394-1995. Per packet, periodically, this high-speed serial interface can transmit print data continuously, as long as there is a printing demand.
[0014] A host computer 1 performs program execution, its control, and a monitor through a predetermined system program. concrete -- not illustrating -- a system board -- a top -- arranging -- having had -- CPU (Central processing Unit) -- RAM (Randum Access Memory) -- ROM (Read Only Memory) -- and -- the above -- a high speed -- serial interface -- ** -- an I/O Port -- built-in -- or -- external -- a hard disk -- (-- HD --) -- three -- providing -- CPU -- necessary -- a program -- suitably -- HD -- three -- from -- reading -- necessary -- processing -- or -- control -- performing -- coming -- **** . The application program (following, "AP") which generates print data, the printing control program for realizing the print control unit of this invention, etc. are recorded on HD3.
[0015] The media reader 6 containing the data entry unit 5 for inputting the indicating equipment 4 and the various setting information that monitor display was provided, a CD-ROM drive, and FDD, and the communication controller 7 used as a connection interface with an in-house network are connected to the host computer 1. The display 4 is constituted so that a predetermined dialog window may be displayed in response to directions of a system program, AP, or a printing control program.

[0016] The control program for realizing a print control unit is recorded on the record medium of portability, for example, a flexible disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, CD-R, DVD, and a magnetic tape with the gestalt which a host computer 1 can read, circulates, and is installed in HD3 through the above-mentioned media reader 6 at the time of use of an airline printer 2. Or it is installed in HD3 from an accessible program server through CCE 7.
[0017] In addition, the function as a print control unit is not only formed, but by performing only the above-mentioned control program, it performs a part of processing that the operating system which is working on the host computer 1 concerned based on directions of the control program is actual, and the function as a print control unit may be formed through the processing.
[0018] Next, the gestalt of operation of the print control unit of this invention realized when the above-mentioned host computer 1 reads the above-mentioned printing control program is explained. Drawing 2 is the important section block diagram of the print control unit by this operation gestalt. The print control unit 10 of this operation gestalt is equipped with a spooler 11, the printing Management Department 12, buffer memory 13, the transfer control section 14, and the I/O driver 15 as shown in drawing 2 .
[0019] The data for printing sent out from AP are temporarily stored in a spooler 11. The printing Management Department 12 reads the data for printing from a spooler 11 based on AP or the contents of an input from a data entry unit 5 (printing demand), and creates the print data of the gestalt which suited the airline printer 2 based on this. These print data are passed to the transfer control section 14.
[0020] The transfer control section 14 reads and transmits these print data according to the printing activation situation of an airline printer 2 while buffering print data in buffer memory 13. In more detail, the transfer rate of print data is detected periodically, the buffer size of the print data of degree period is dynamically changed according to the transfer rate of the print data of a front period, and the quiescent time of the print-data creation in an airline printer 2 or the printing Management Department 12 is controlled.
[0021] The I/O driver 15 mainly performs the output control of the print data in I/O Port 16 which is hardware.
[0022] Especially the operations sequence of the transfer control section 14 is as [being shown in drawing 3 and drawing 4] the print control unit 10 constituted as mentioned above.
[0023] That is, as shown in drawing 3 , a print control unit 10 detects first the size of the mounting memory which can be buffered, i.e., the size of buffer memory 13, ignited by activation initiation of the print job from AP etc. (step S101), and determines the maximum which can be buffered based on this detection value (step S102). This maximum is not necessarily in agreement with the maximum size which can transmit high-speed serial interface. When smaller than the maximum which can buffer the latter maximum size, in consideration of a changed part of the transfer rate mentioned later, it considers as the maximum which can buffer a little larger size than maximum. When the maximum size by high-speed serial interface which can be transmitted is larger than the size of mounting memory, it makes size a little smaller than the size of this mounting memory the above-mentioned maximum. The determined maximum is recorded on the memory area which is not illustrated.
[0024] Although the transfer control section 14 is transmitted to the airline printer 2 in the transaction format for every packet, buffering the print data which the printing Management Department 12 created in buffer memory 13, about the print data of the first period, when an airline printer 2 starts printing, it buffers it with indispensable buffer size or the about buffer size which can be transmitted immediately, for example, 1024 bytes, and transmits this (step S103). Thereby, an airline printer 2 can do this thing for printing preparation immediately.
[0025] After that, the transfer rate about the print data of the period concerned is detected (step S104), and the buffer size of the print data of degree period is dynamically changed according to the detected transfer rate. That is, when a transfer rate falls rather than the thing of a front period according to the printing activation situation by the airline printer 2 When buffer size of degree period is changed in the direction which a transfer rate goes up (small) (step S105: Yes, S106) and a transfer rate rises rather than the thing of a front period on the other hand Buffer size of degree period is changed in the direction to which it falls (step S105: No, S107). (greatly) About the buffer size of each period, it is held and the processing after step S104 is repeated (step S108: No).
[0026] When the total value of the buffer size of the print data generated after printing initiation reaches the maximum size in which the most efficient transfer is possible in a predetermined value, i.e., high-speed serial interface, the buffer size of the print data of (step S108:Yes) and future periods is brought close to the above-mentioned maximum size (step S109), and the transfer rate at that time is detected (step S110).
[0027] According to the transfer rate of a front period, changing the buffer size of the print data of degree period according to the printing activation situation in an airline printer 2 until a print job is not completed and it is completed

by fluctuation of a transfer rate, since it is usual to change a transfer rate somewhat even after moving to drawing 4 and bringing buffer size close to the above-mentioned maximum size is continued dynamically (steps S111-S113). When it is completed by fluctuation of a transfer rate and a print job is completed, modification control of buffer size is finished (step S114: Yes).

[0028] Thus, drawing 5 showed the buffer size changed dynamically. B1 of drawing 5 is the maximum size in which the most efficient transfer is possible in the above-mentioned high-speed serial interface, and T1 is a time of the total value of buffer size reaching this maximum size B1.

[0029] Since the print data of the size which can be printed immediately are transmitted to an airline printer 2 as one packet after printing initiation by performing such transfer control, the quiescent time of an airline printer 2 becomes short, and since the print data of the size near the most efficient maximum size are transmitted to an airline printer 2 as one packet in high-speed serial interface after fixed time amount progress, the quiescent time in the case of the print-data creation in the printing Management Department 12 becomes short. Thereby, the conventional trouble is canceled.

[0030] In addition, although this operation gestalt showed the example in the case of existing as a function which the transfer control section 14 became independent of, you may exist as an attached function of the printing Management Department 12 or the I/O driver 15. Moreover, although high-speed serial interface also has the more effective thing of USB or IEEE conformity, as for this invention, the effectiveness that things other than such an interface are also fixed is acquired.

[0031]

[Effect of the Invention] Since the quiescent time of an airline printer of operation and the creation quiescent time by the creation means of print data can be shortened according to this invention so that clearly from the above explanation, characteristic effectiveness [say / that effective use of a resource is attained] is acquired.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to a printing control technique, and relates to the efficient data transfer technique of the print data transmitted to an airline printer in more detail.

[Translation done.]

PRIOR ART

[Description of the Prior Art] When printing the print data generated with the host computer with airline printers, such as a printer, a host computer is opened from a print-data creation activity by what (a spool file is formed) print data are once spooled for by the buffer memory of a host computer. Next, in order to transmit the spooled print data to an airline printer, it is common to enable it to perform creation of the print data based on a host computer and printing with an airline printer in parallel by starting another process, reading print data from a spool file according to the processing speed by the side of an airline printer, and transmitting to an airline printer side. The size of the print data which are read from a spool file and transmitted to an airline printer is usually about 4096 bytes, and buffering is performed by making this size into a unit.

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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Recently, USB (Universal Serial Bas) and high-speed serial interface like IEEE standard 1394-1995 (IEEE=The Institute of Electrical and Electronics Engineers, Inc.) are used as a connection interface between a host computer and an airline printer. In such high-speed serial interface, the buffering size (for example, 4096 bytes) in which the print data received from the high order hierarchy were stored is divided into the packet size (for example, 512 bytes) decided by the specification of serial interface, and the I/O driver for carrying out the sequential transfer exists in an I/O Port in the data after division, i.e., a packet. In this I/O driver, in order to perform the transfer to an I/O Port in the transaction format for every packet, the bitter taste no ledge processing for checking that data have been normally transmitted for every packet is needed.

[0004] Usually, in an I/O driver, since an overhead arises for every one buffering, in order to raise a transfer rate, effectiveness becomes [the direction which enlarged buffering size passed to an I/O driver as much as possible] good. For example, since the direction of the count [of writing] to an I/O driver made into 1 megabyte decreases rather than making buffering size into 4096 bytes when transmitting 10 megabytes of print data (the overhead by the I/O driver decreases), efficient data transfer becomes possible.

[0005] However, if 1 time of buffering size (that is, transfer size of print data) is enlarged too much, before it reaches an airline printer and printing processing is started, it will take great time amount. In the meantime, in an airline printer side, since printing processing was stopped, there was a problem which cannot utilize a resource effectively.

[0006] Then, let it be a technical problem for this invention to offer the improved data transfer approach by which effective use of a resource is attained.

[0007] Other technical problems of this invention are to offer the record medium which becomes suitable when realizing the print control unit suitable for operation of this data transfer approach, and this print control unit on a computer.

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MEANS

[Means for Solving the Problem] The data transfer approach of this invention which solves the above-mentioned technical problem It is the approach performed in the computer apparatus which buffers in case the print data for performing printing of a predetermined gestalt are periodically transmitted to an airline printer. The print data of the first period are buffered with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned When the total value of the buffer size of the print data generated after printing initiation reaches a predetermined value, it is characterized by bringing the buffer size of the print data of future periods close to the maximum size in which the most efficient transfer is possible.
[0009] At the time of printing initiation, this maximum detects the memory size for said buffering, and determines it based on this detection value. According to the transfer rate of a front period, changing the buffer size of the print data of degree period until it is preferably completed by fluctuation of a transfer rate, even after bringing close to said maximum size is continued dynamically. Thereby, print data can be efficiently transmitted now. In addition, the futility at the time of transmitting print data to high-speed serial interface can be excluded by making total value of said buffer size into the value which controls the quiescent time of the creation means of the airline printer under printing actuation, or the print data of each period.
[0010] The print control unit of this invention which solves a technical problem besides the above A print-data creation means to create the print data for making an airline printer perform printing of a predetermined gestalt, While transmitting to said airline printer periodically, buffering the created print data, the transfer rate of each period is detected. It has the control means which changes the buffer size of the print data of degree period dynamically according to the transfer rate of a front period, and is characterized by controlling the quiescent time of said airline printer and said print-data creation means.
[0011] In the above-mentioned print control unit said control means For example, the print data of the first period based on a printing demand are buffered with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned When the total value of the buffer size of the print data from said first period reaches a predetermined value, it constitutes so that the buffer size of the print data of future periods may be brought close to the maximum size in which the most efficient transfer is possible. Moreover, modification control of said buffer size is continued after bringing close to said maximum size until it is completed by fluctuation of a transfer rate. In addition, for example, at the time of printing initiation, said maximum size detects the memory size for said buffering, and determines it based on this detection value.
[0012] The record medium of this invention which solves a technical problem besides the above To the computer apparatus periodically transmitted to an airline printer while the print data for performing printing of a predetermined gestalt are buffered The print data of the first period based on a printing demand are buffered with indispensable buffer size, when said airline printer starts printing. While changing the buffer size of the print data of degree period dynamically according to the transfer rate about the print data of the period concerned When the total value of the buffer size of the print data generated after printing initiation reaches a predetermined value Until it is completed by fluctuation of the transfer rate after bringing the buffer size of the print data of future periods close to the maximum size in which the most efficient transfer is possible and bringing close to said maximum size further It is the record medium with which the program code for performing processing which changes the buffer size of the print data of degree period dynamically according to the transfer rate of a front period was recorded and in which computer reading is possible.
[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. First, an example of the printing system by which this invention is applied is shown in drawing 1 . This printing system connects a host computer 1 and an airline printer 2 through the high-speed serial interface based on IEEE standard 1394-1995. Per packet, periodically, this high-speed serial interface can transmit print data continuously, as long as there is a printing demand.

[0014] A host computer 1 performs program execution, its control, and a monitor through a predetermined system program. concrete -- not illustrating -- a system board -- a top -- arranging -- having had -- CPU (Central processing Unit) -- RAM (Randum Access Memory) -- ROM (Read Only Memory) -- and -- the above -- a high speed -- serial interface -- ** -- an I/O Port -- built-in -- or -- external -- a hard disk -- (-- HD --) -- three -- providing -- CPU -- necessary -- a program -- suitably -- HD -- three -- from -- reading -- necessary -- processing -- or -- control -- performing -- coming -- **** . The application program (following, "AP") which generates print data, the printing control program for realizing the print control unit of this invention, etc. are recorded on HD3.

[0015] The media reader 6 containing the data entry unit 5 for inputting the indicating equipment 4 and the various setting information that monitor display was provided, a CD-ROM drive, and FDD, and the communication controller 7 used as a connection interface with an in-house network are connected to the host computer 1. The display 4 is constituted so that a predetermined dialog window may be displayed in response to directions of a system program, AP, or a printing control program.

[0016] The control program for realizing a print control unit is recorded on the record medium of portability, for example, a flexible disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, CD-R, DVD, and a magnetic tape with the gestalt which a host computer 1 can read, circulates, and is installed in HD3 through the above-mentioned media reader 6 at the time of use of an airline printer 2. Or it is installed in HD3 from an accessible program server through CCE 7.

[0017] In addition, the function as a print control unit is not only formed, but by performing only the above-mentioned control program, it performs a part of processing that the operating system which is working on the host computer 1 concerned based on directions of the control program is actual, and the function as a print control unit may be formed through the processing.

[0018] Next, the gestalt of operation of the print control unit of this invention realized when the above-mentioned host computer 1 reads the above-mentioned printing control program is explained. Drawing 2 is the important section block diagram of the print control unit by this operation gestalt. The print control unit 10 of this operation gestalt is equipped with a spooler 11, the printing Management Department 12, buffer memory 13, the transfer control section 14, and the I/O driver 15 as shown in drawing 2 .

[0019] The data for printing sent out from AP are temporarily stored in a spooler 11. The printing Management Department 12 reads the data for printing from a spooler 11 based on AP or the contents of an input from a data entry unit 5 (printing demand), and creates the print data of the gestalt which suited the airline printer 2 based on this. These print data are passed to the transfer control section 14.

[0020] The transfer control section 14 reads and transmits these print data according to the printing activation situation of an airline printer 2 while buffering print data in buffer memory 13. In more detail, the transfer rate of print data is detected periodically, the buffer size of the print data of degree period is dynamically changed according to the transfer rate of the print data of a front period, and the quiescent time of the print-data creation in an airline printer 2 or the printing Management Department 12 is controlled.

[0021] The I/O driver 15 mainly performs the output control of the print data in I/O Port 16 which is hardware.

[0022] Especially the operations sequence of the transfer control section 14 is as [being shown in drawing 3 and drawing 4] the print control unit 10 constituted as mentioned above.

[0023] That is, as shown in drawing 3 , a print control unit 10 detects first the size of the mounting memory which can be buffered, i.e., the size of buffer memory 13, ignited by activation initiation of the print job from AP etc. (step S101), and determines the maximum which can be buffered based on this detection value (step S102). This maximum is not necessarily in agreement with the maximum size which can transmit high-speed serial interface. When smaller than the maximum which can buffer the latter maximum size, in consideration of a changed part of the transfer rate mentioned later, it considers as the maximum which can buffer a little larger size than maximum. When the maximum size by high-speed serial interface which can be transmitted is larger than the size of mounting memory, it makes size a little smaller than the size of this mounting memory the above-mentioned maximum. The determined maximum is recorded on the memory area which is not illustrated.

[0024] Although the transfer control section 14 is transmitted to the airline printer 2 in the transaction format for every

packet, buffering the print data which the printing Management Department 12 created in buffer memory 13, about the print data of the first period, when an airline printer 2 starts printing, it buffers it with indispensable buffer size or the about buffer size which can be transmitted immediately, for example, 1024 bytes, and transmits this (step S103). Thereby, an airline printer 2 can do this thing for printing preparation immediately.

[0025] After that, the transfer rate about the print data of the period concerned is detected (step S104), and the buffer size of the print data of degree period is dynamically changed according to the detected transfer rate. That is, when a transfer rate falls rather than the thing of a front period according to the printing activation situation by the airline printer 2 When buffer size of degree period is changed in the direction which a transfer rate goes up (small) (step S105: Yes, S106) and a transfer rate rises rather than the thing of a front period on the other hand Buffer size of degree period is changed in the direction to which it falls (step S105: No, S107). (greatly) About the buffer size of each period, it is held and the processing after step S104 is repeated (step S108: No).

[0026] When the total value of the buffer size of the print data generated after printing initiation reaches the maximum size in which the most efficient transfer is possible in a predetermined value, i.e., high-speed serial interface, the buffer size of the print data of (step S108:Yes) and future periods is brought close to the above-mentioned maximum size (step S109), and the transfer rate at that time is detected (step S110).

[0027] According to the transfer rate of a front period, changing the buffer size of the print data of degree period according to the printing activation situation in an airline printer 2 until a print job is not completed and it is completed by fluctuation of a transfer rate, since it is usual to change a transfer rate somewhat even after moving to drawing 4 and bringing buffer size close to the above-mentioned maximum size is continued dynamically (steps S111-S113). When it is completed by fluctuation of a transfer rate and a print job is completed, modification control of buffer size is finished (step S114: Yes).

[0028] Thus, drawing 5 showed the buffer size changed dynamically. B1 of drawing 5 is the maximum size in which the most efficient transfer is possible in the above-mentioned high-speed serial interface, and T1 is a time of the total value of buffer size reaching this maximum size B1.

[0029] Since the print data of the size which can be printed immediately are transmitted to an airline printer 2 as one packet after printing initiation by performing such transfer control, the quiescent time of an airline printer 2 becomes short, and since the print data of the size near the most efficient maximum size are transmitted to an airline printer 2 as one packet in high-speed serial interface after fixed time amount progress, the quiescent time in the case of the print-data creation in the printing Management Department 12 becomes short. Thereby, the conventional trouble is canceled.

[0030] In addition, although this operation gestalt showed the example in the case of existing as a function which the transfer control section 14 became independent of, you may exist as an attached function of the printing Management Department 12 or the I/O driver 15. Moreover, although high-speed serial interface also has the more effective thing of USB or IEEE conformity, as for this invention, the effectiveness that things other than such an interface are also fixed is acquired.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The printing structure-of-a-system Fig. where this invention is applied.
[Drawing 2] The important section block diagram of the print control unit by the operation gestalt of this invention.
[Drawing 3] The procedure explanatory view of updating control of the buffer size by this operation gestalt.
[Drawing 4] The procedure explanatory view of updating control of the buffer size by this operation gestalt (continuation).
[Drawing 5] The explanatory view having shown the situation of the buffer size changed according to this operation gestalt.
[Description of Notations]
1 Host Computer
2 Printer
3 Hard Disk
4 Display
5 Data Entry Unit
6 Media Reader
7 Communication Controller
10 Print Control Unit
11 Spooler
12 Printing Management Department
13 Buffer Memory
14 Transfer Control Section
15 I/O Driver
16 I/O Port

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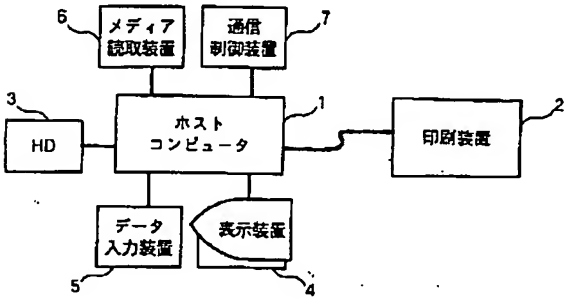
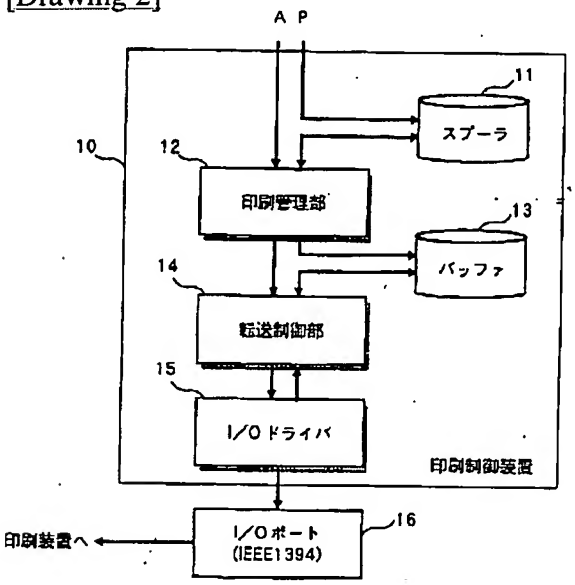
DRAWINGS

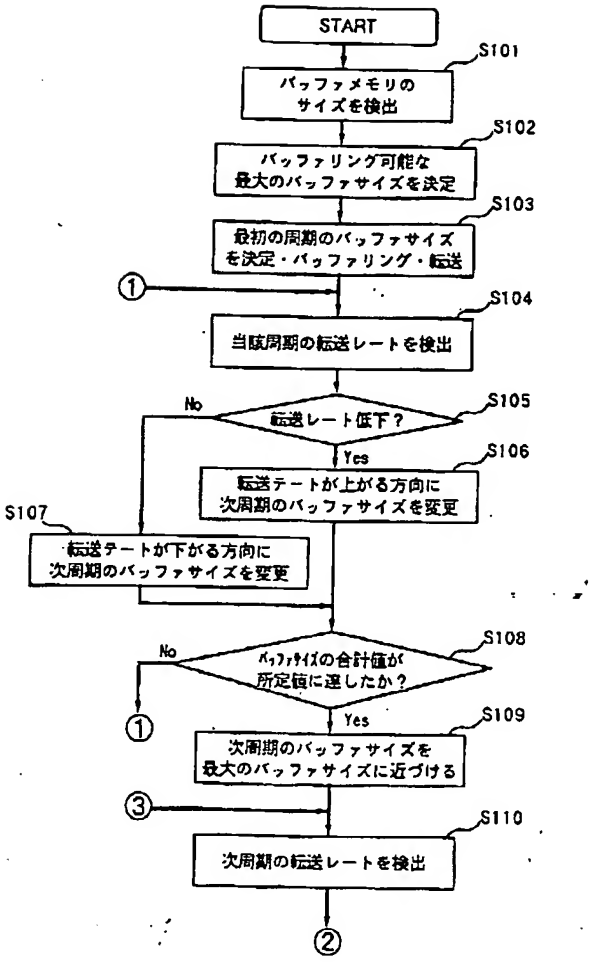
[Drawing 1]



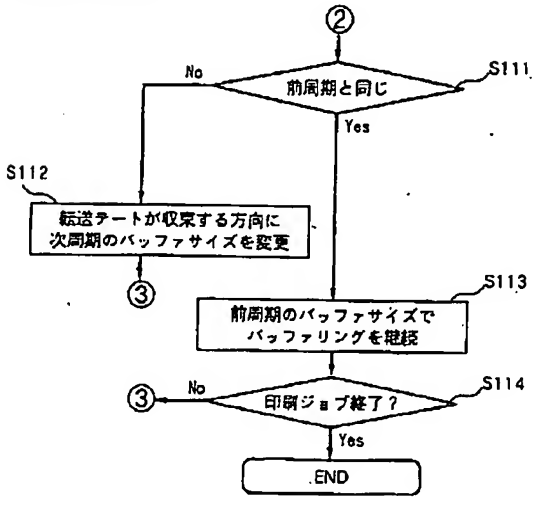
[Drawing 2]



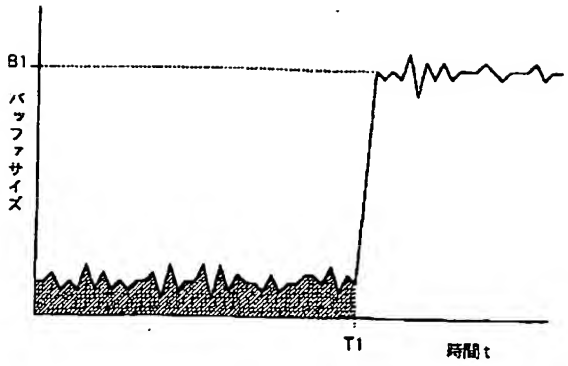
[Drawing 3]



[Drawing 4]



[Drawing 5]



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